

Interchangeable Lenses

by Jack & Sue Drafahl

A camera body is only as good as the lens attached to the front of it. If the lens can't perform its specific task, then all the fancy features in the body behind it are wasted. That is why lens selection is so important. Although there are many things

They give you new points of view

to consider when buying a lens, don't despair. We're here to help you with your lens-buying decisions.

The most important thing to remember is that every photographer has a different style of taking pictures. What is right for one photographer, might not be the correct selection for the next. This makes it imperative that

each photographer identify the type of photography he or she wants to do, and then match the lens to the job. For example, a wildlife photographer might use extreme telephoto lenses for distant subjects and a macro lens for close subjects. A photojournalist may require an extreme-range zoom to minimize the bulk of equipment to carry, or a very fast lens to work in low light conditions. Portrait photographers would lean toward short telephoto lenses to minimize distortion in their portraits. In order to help you better understand your choices, let's take a look at the parts of a camera lens.

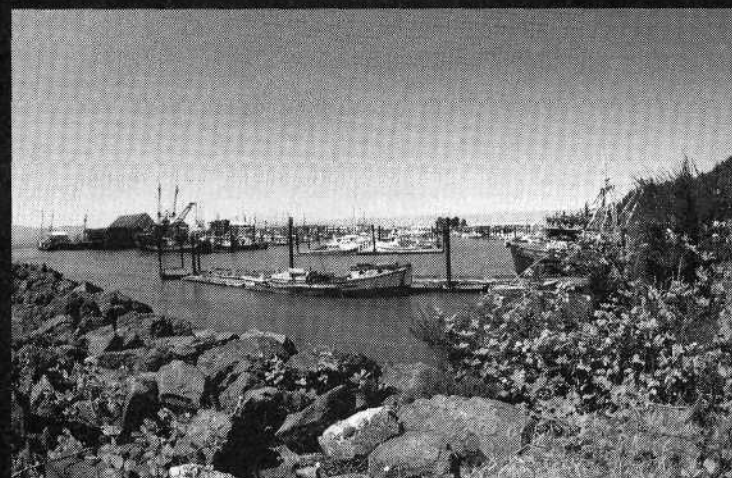
LENS MOUNT

The back of the lens is where it is mounted to camera. This is one of the most fragile parts of the lens because this is where you find electronic connections, mechanical linkage, and the rear elements. This area is not designed to be in open air, so if it not attached to the camera, be sure to use a special rear lens cap to protect it during transport. Most lenses today use a bayonet mount system where you insert the lens into the camera, then turn it slightly to lock the lens in place.

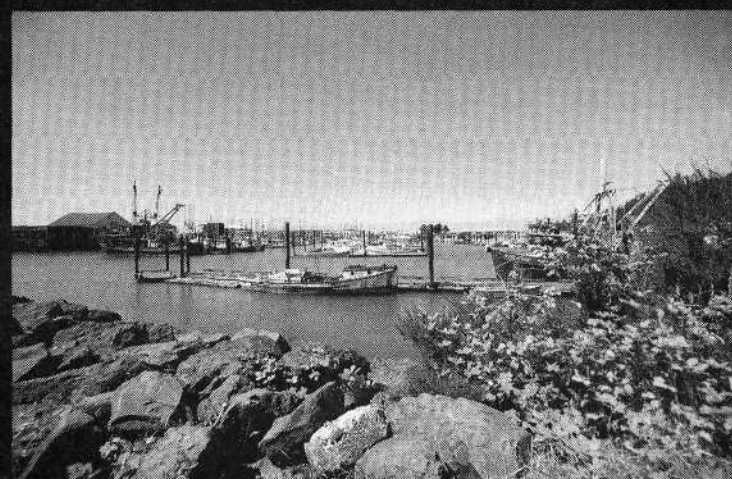
APERTURE

Moving toward the front of the lens, you will discover the f-stop ring that controls the size of the lens opening, or aperture. The is marked with f-numbers such as f/2.8, f/4, f/5.6, f/8, f/11, f/16 and f/22. The numbers represent the ratio between the diameter of the lens opening and the focal length of the

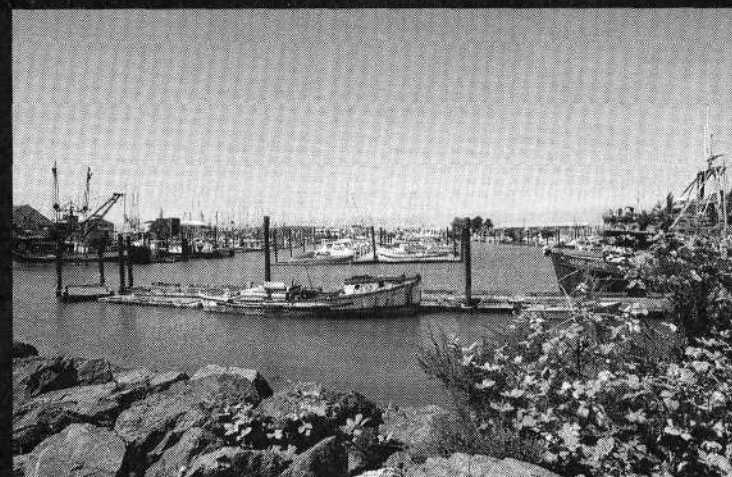
Interchangeable lenses let you change the magnification and angle of view. Here's the same scene shot with lenses ranging from a 16mm full-frame fisheye and a 14mm superwide-angle to a 1250mm supertelephoto.



16mm full-frame fisheye



14mm superwide-angle



20mm superwide-angle



24mm wide-angle

lens: $f/8$ means the opening is $\frac{1}{8}$ the focal length of the lens; $f/16$ means the aperture diameter is $\frac{1}{16}$ the focal length of the lens. The smaller the aperture and greater the number, the more light the lens transmits to the film (and SLR viewfinder). A lens that opens to $f/1.4$ allows more light to enter the lens than one that opens only to $f/2.8$. Lenses with larger maximum apertures are called fast lenses and usually carry a higher price tag. As you

increase the value of the f -numbers, the aperture inside becomes smaller and less light passes through the lens. Zoom lenses have a variable maximum aperture, like $f/3.5-4.5$ because the aperture narrows as you zoom.

DEPTH OF FIELD

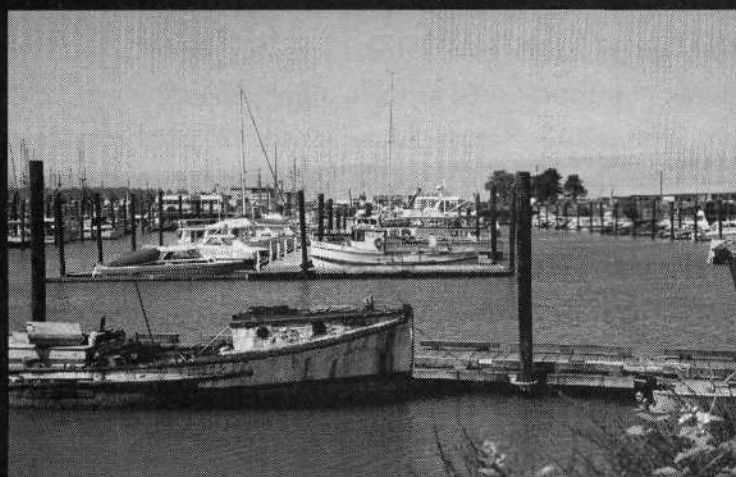
Depth of field is the amount of area in your picture in front



28mm wide-angle



35mm wide-angle



50mm normal



100mm short telephoto



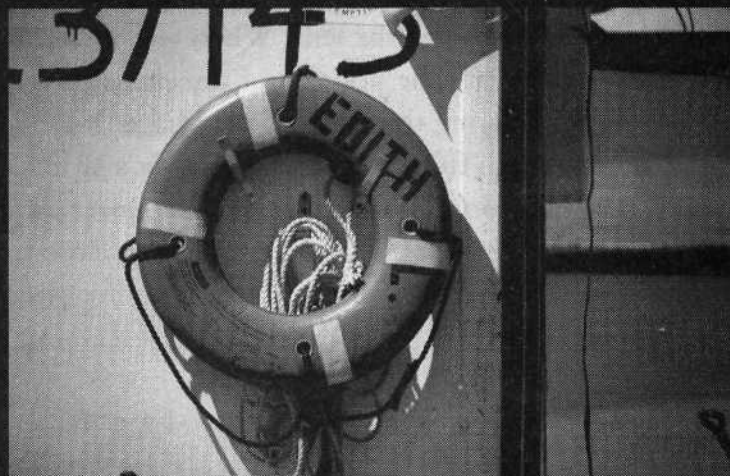
200mm telephoto



300mm supertelephoto

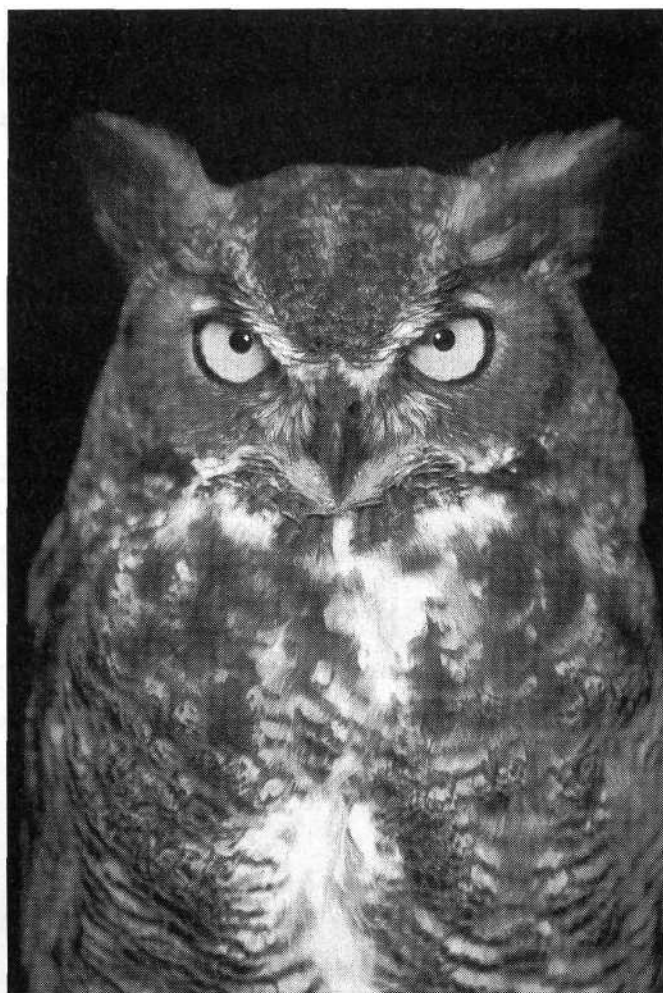


500mm supertelephoto



1250mm supertelephoto

Telephoto lenses let you “bring distant subjects to you,” by cropping in and magnifying them.



Move in close to a subject with a wide-angle lens, and the subject becomes huge relative to more-distant objects in the scene.

of and beyond the point focused upon that will appear sharp at a given f-stop. Some lenses have a depth-of-field scale, consisting of hash marks next to the aperture numbers indicating the range of focus for each respective f-stop. When you use a small aperture, like $f/22$, you will have quite an area in focus on either side of the focus point in your photo. If you set your lens to $f/3.5$ to let in more light, the trade-off is that the depth of field will be very shallow on either side of the focus point.

Focal length is the distance between the optical center of the lens and the film plane when the lens is focused on infinity. The focal length controls the size of the image formed by the lens (the magnification), and the size of the area of the scene the lens takes in (the angle of view). The focal length of your lens also plays a big part in determining depth of field. The longer the focal length of your lens, the closer the focus points are together (the less the depth of field).

FOCUS CONTROL

Most of the lenses today have both auto and manual focusing systems. The autofocus system is linked inside the camera through the back of the lens and is activated by depressing the shutter release. Manual focusing is controlled with a ring near the front of the lens. When you rotate the ring, it manually changes the position of the elements inside the lens, thereby changing the focus of the image. Most autofocus lenses switch from auto to manual via a switch on the side of the lens. Some autofocus lenses that cover extreme ranges feature a switch to limit the focus range to close-to-medium or medium-to-far distances, to speed up focusing.

TYPES OF LENSES

For 35mm cameras, a 50mm lens is considered the normal lens because it most closely represents the view of the human eye. It is also the lens that is commonly found on

most 35mm camera packages. You could probably get some great pictures using this one lens for quite some time, but as your interest in photography grows, you will be lens shopping. One of the most versatile features of the 35mm camera system is interchangeable lenses. You can attach different lenses to perform different tasks. Selecting a variety of different lenses gives you the tools to expand the creative aspect of your photo skills.

WIDE-ANGLE LENSES

Wide-angle lenses have a focal length shorter than 50mm. The most common types of wide-angle lenses range from 24mm, 28mm and 35mm. These lenses are used to record a larger image area than is possible with your normal lens without moving back from the scene. With wide-angle lenses, depth of field is greater, which makes them handy for photos of large groups or scenics.

Extreme wide-angle lenses range from 14mm to 21mm. These tend to get larger in size because of all the optical glass, which in turn, makes them more expensive. The advantages of superwide-angle lenses are the ability to get in close to a subject and still get it all in the photo, extreme depth of field, exaggerated perspective control and deliberate distortion.

Fisheye lenses come in two basic formats: circular and full-frame. Full-frame fisheye lenses take frame-filling rectangular pictures, but curve straight lines that don't go right through the center of the image. Circular fisheye lenses create a round image that is unique but should be used sparingly. Both types of fisheye lenses have angles of view of 180° or more, so the images generally encompass everything that is in front of you.

Because subject matter in the wide-angle scene is a lot smaller in proportion to the overall scene, you can handhold your camera at a lower shutter speeds. The general rule of thumb is that you can use shutter speeds comparable to the

focal length of your lens. A 35mm lens can be hand-held at $\frac{1}{30}$ second, while a 15mm lens can be hand-held at $\frac{1}{15}$ second.

TELEPHOTO LENSES

Telephoto lenses zero-in on a portion of the scene and magnify it, which has the effect of bringing the photographer closer to the subject than he or she actually is. As the focal length increases, the magnification increases, and so does the size of the lens. As the speed of the lens gets faster (larger apertures), the lens will also get bigger—for example, one manufacturer's 400mm f/5.6 telephoto is 10.1 inches long, with a diameter of 3.5 inches and a weight of 2.75 pounds; the same manufacturer's 400mm f/2.8 telephoto is 13.7 inches long, with a diameter of 6.4 inches and a weight of 11.7 pounds.

Telephoto lenses cover an extreme range of focal lengths and are usually grouped into short and long telephotos. The short telephoto, from 75mm to 135mm, is good for portrait images as they provide a good head size at a distance that produces a pleasant perspective. Large apertures, like f/2 or f/2.8, are common with these lenses, which lets you higher shutter speeds for more control over action shots.

The longer telephoto lens, from 150mm to 600mm and beyond, are well suited for sports and nature photography. Since they feature a shallow depth of field, you can isolate your subject against an out-of-focus background. With these

supertelephoto lenses, you will quickly find that as the aperture becomes larger, so does the lens and the price tag. Before you invest in this type of lens, take a serious look at the fastest aperture opening you require. There is no sense in paying big bucks for an f/2.8 lens and finding that you never shoot at apertures wider than f/5.6.

Long telephoto lenses create compression, the illusion that subjects are closer together than they actually are. This is caused by the increased shooting distance. Sometimes this is a desired effect, while other times it is just a side effect of using telephoto lenses.

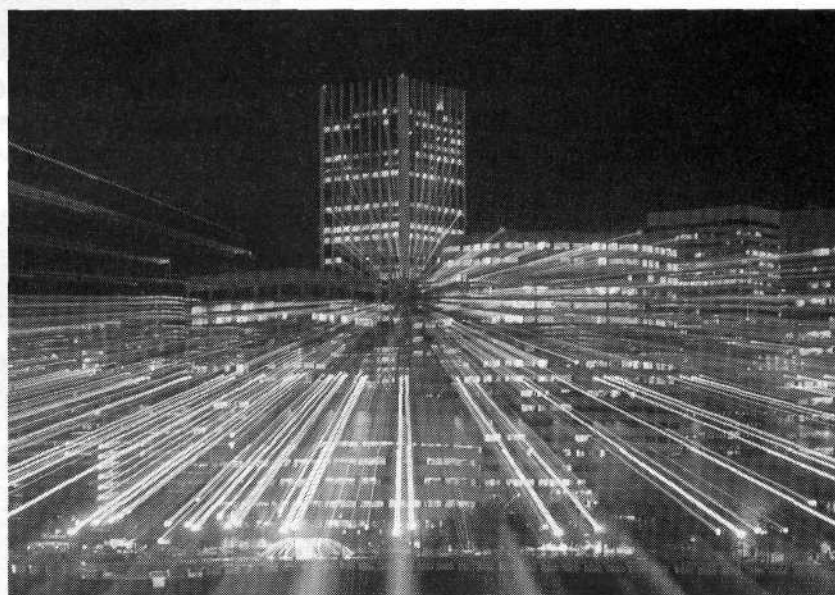
As focal length increases, the increased magnification increases the effects of camera shake. You will find it necessary to use a tripod to avoid blurred images due to camera movement. Most telephoto lenses have a tripod socket either on the lens itself, or on a collar. A good rule of thumb is that you can not hand-hold a lens when using a shutter speed less than the focal length of the lens; e.g., use at least $\frac{1}{250}$ with a 200mm lens.

ZOOM LENSES

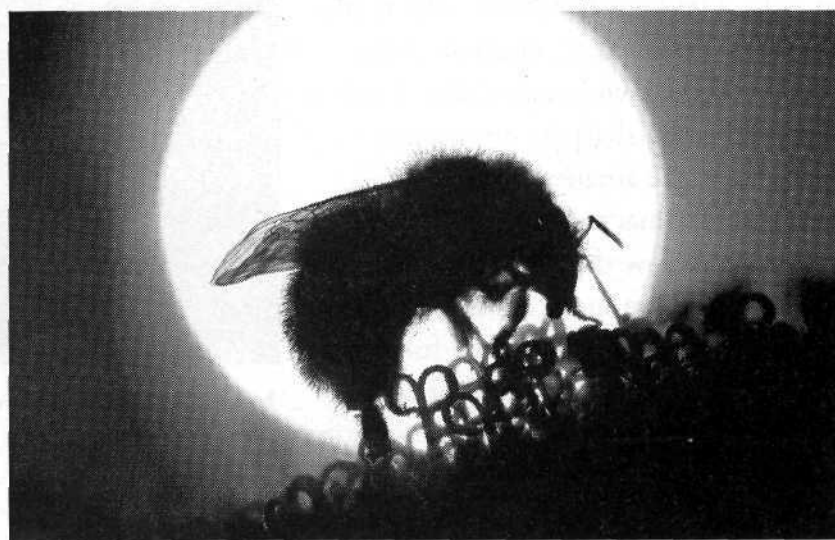
These lenses have become very popular because they enable you to have a variety of focal lengths all in one lens. Focal lengths vary from extreme wide angle to wide angle, wide angle to telephoto, and telephoto to extreme telephoto.



Fast lenses transmit more light to the film (and to the SLR viewfinder), making it easier to shoot in dim lighting.



Zoom lenses allow you to change to focal length by operating the zoom ring. Zoom the lens during a one- or two-second exposure, and you can produce an "explosion" effect.



Macro lenses let you move very close to a subject, and record it life size on the film.

One lens takes the place of several, which makes zooms cost effective and convenient. You can easily frame an image and then use the zoom to move into the scene without moving or even changing lenses.

Generally, wide-angle-to-telephoto zooms use a zoom ring to change focal lengths. When you twist this ring, the focal length changes. Some of the longer zoom telephoto lenses use a sliding sleeve to change the focal length. Most of the newer zooms also have a lever on the zoom to switch into the macro function.

A few years ago, zoom lenses were often the second choice over prime lenses, those with a single focal length. Zoom lenses were heavier and often produced lesser image quality. Thanks to technological advancements, the compact zoom lens has become one of the most desired lenses for the camera bag!

The advantages of zoom lenses are that one lens can take the place of several, and that you can quickly change focal lengths when shooting pictures. The disadvantages are that they are still often bigger than the prime lenses, and have variable aperture systems for the widest opening of the lens.

You can also create special effects with your zoom lens. A unique effect is achieved by zooming the lens during a relatively long exposure of one or two seconds.

MACRO LENSES

If you want to record the world of the small in great detail, then the macro lens may be the ticket. Macro lenses allow you produce a life-size, or 1:1 image ratio. Most have a wide range of f-stops, down to as small as f/32, which provides incredible depth of field. Unlike other lenses which are generally designed to sharpest about two stops from wide open, the macro is designed to be sharpest one or two stops from the smallest aperture. In recent years, macro lenses have become longer, and now the 100–200mm macro lenses are more common. The longer lenses allow you to be further from your subject and still obtain that extreme fine detail. This makes working with skittish animals easier.

MIRROR LENSES

The mirror lens is one of the oldest lens designs, dating

back to Leonardo DaVinci, and is similar in concept to reflecting telescopes. This lens uses mirrors to bounce the light back and forth inside the lens and then forces it through a small correction lens before it strikes the film.

Most have a fixed f-stop, usually about f/8. Since it uses mirrors and glass elements to move the light around, the mirror lens provides a long focal length in a small package.

The compact size also makes it great for long hiking expeditions where bulk and weight are considerations. The disadvantages are that mirror lenses usually have manual focus, an f-stop that requires fast film, and generally are not as sharp as prime lenses of the same focal length. If you don't shoot a lot of extreme telephoto images, but still want the capability, this type of lens may be best for you.

You can often spot a shot taken with a mirror lens. Their unique front mirror design often causes highlights to take on an out-of-focus donut shape rather than a hexagonal shape produced by normal telephoto lenses.



The “normal” lens (50mm for a 35mm camera) is fine for general photography, but wider and longer lenses let you do more.



Mirror lenses are an economical way to get long focal lengths in a compact package.

PERSPECTIVE-CONTROL LENSES

One of the problems shooting wide-angle architectural images is the convergence of straight lines. The building seems to be leaning back because you had to tilt the camera to get it all in the picture. The perspective-control (PC) lens has a front element that can be shifted off axis and still maintain full image quality. This shifting of the lens allows the photographer to keep the camera level and still capture the tops of the building with no perspective distortion.

SOFT-FOCUS LENSES

The soft focus lens is a very specialized lens generally used by portrait and commercial photographers who want to create a dream-like effect in their images. The subject remains sharp in the images, but an overlay of soft light creates the dreamy effect. The lens is ideal for portraiture as it helps soften wrinkles and complexion flaws.

TELE-CONVERTERS AND LIFE-SIZERS

The tele-converter attaches to the back of the lens and

has optical elements that increase the focal length of the lens. If you want to shoot only occasionally at longer focal lengths, this is a great alternative. Tele-converters increase the focal length of your lens by 1.4X or 2X. A 200mm lens with a 2X tele-converter will perform like a 400mm lens. Some AF tele-converters provide autofocus with some non- autofocus lenses.

When tele-converters first came out, the results were not very good, but over the years the technology has made some major improvements. Today, they are lightweight, compact and more economical than buying several lenses to do the same job. Bear in mind that the trade-off is the fact you lose about two stops of light, so your 200mm f/2.8 becomes a 400mm f/5.6.

Another type of lens converter is the life-sizer. Some macro lenses don't focus down to 1:1 (life size) on their own. The life-sizer allows them to focus down to life size.

OPTIMIZING THE USE OF YOUR LENSES

There are several things you can do to get the most from your lenses. Understanding how best to use each lens will translate directly into better photographs.

Whenever you add a new lens to your system, you should perform extensive tests on focus, trying various apertures, and different focal lengths if it is a zoom lens. Each lens has a different optimum working standard, and it will maximize your image quality if you know the best working specifications of each lens. You should also understand how each of your lenses will handle depth of field, perspective, focus, and moving subjects. Try all your lenses on a single subject and compare the results.

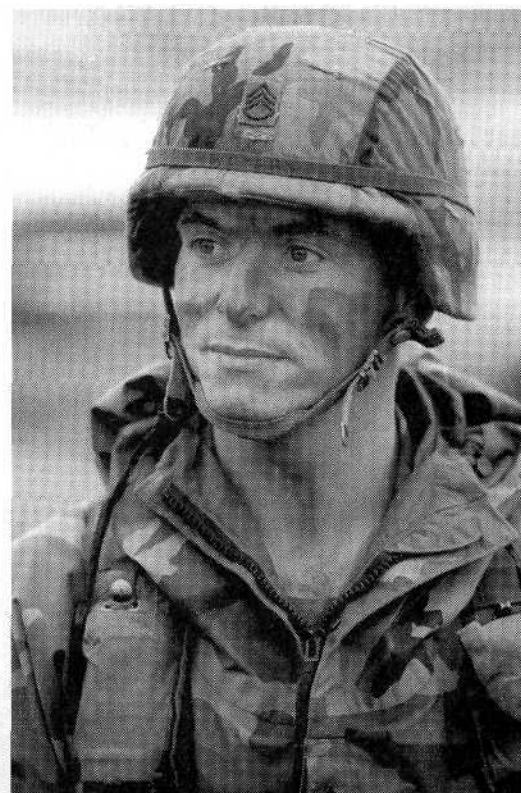
Eventually, you will accumulate several lenses that may overlap in their respective tasks. Don't try to take every lens on every photo shoot just because you have them. You are

not required to fill your camera bag! If you have tested each lens and understand how they work, you will be able to select only those lenses best suited for a specific shoot.

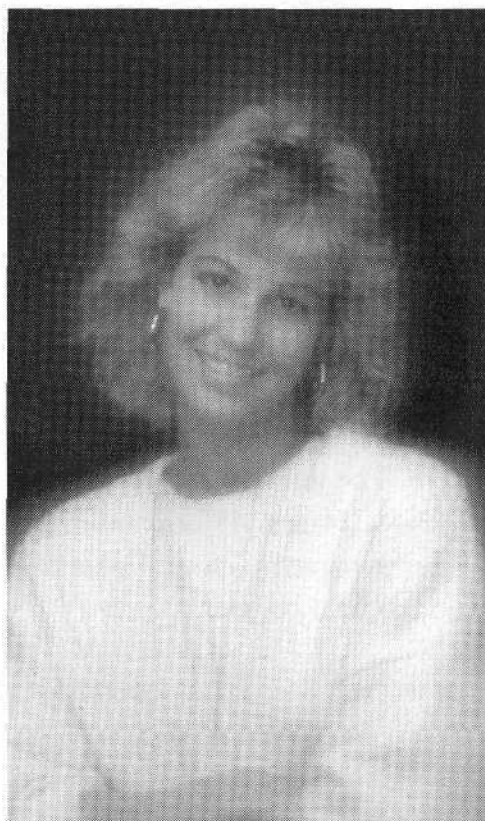
You need to take good care of your lenses. Dust, grease and moisture can scatter the light that passes through the lens, degrading the quality of your photos. You need to keep your lenses clean, but remember not to overdo your rubbing as you could damage the thin lens coating. Use a blower

brush for light dust removal. The squeeze a small drop of lens cleaning solution on your lens cleaning tissue and *gently* clean the lens in a circular motion. Lenses are complex, fragile instruments and you can easily degrade their integrity by scratching and overzealous cleaning methods.

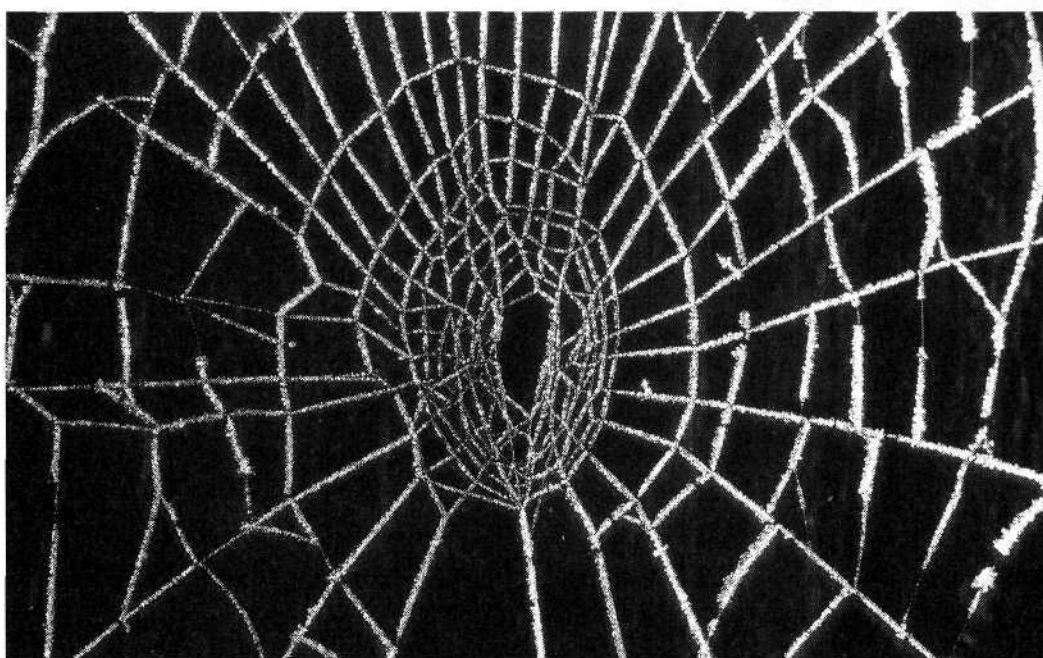
The life of your lens can be maximized by giving it proper care. This means using rear and front lens caps when the lens is not in use, soft dividers when the lens is in the camera bag, and adequate protection against the environment. Use a UV or skylight filter to protect the front element of your lenses. Be sure to carefully select a camera bag that provides adequate protection for these delicate instruments as you travel. Make room in your camera bag for a plastic bag, lens brush, lens-cleaning solution and



Short telephoto lenses are perfect for portraits, because they produce a good head size from a distance that produces pleasing perspective.



Soft-focus lenses produce a soft, glowing effect that's great for portraits.



Most "macro" zoom lenses aren't really "macro"—they won't focus closer than 1/4 life-size or so. But that's close enough to produce some dramatic close-ups of well-chosen subjects.

cleaning tissues.

Use a lens hood to reduce flare, but be sure that it is designed for the specific lens that you are using. If not, you might experience vignetting, or darkened areas in the corners of your photos.

We have explained the different types of lenses and the following is an overview of lens offerings available for SLR 35mm cameras. We have included information from both the

camera manufacturers and independent lens manufacturers for your review. (The listings are in alphabetical order, by manufacturer.)

CAMBRON

Cambron offers an economical selection of zoom and fixed-focal-length lenses to accommodate most SLR camera manufacturers. Zoom lenses seem to dominate this manufacturer's lens lineup. They offer something for everyone interested in zoom lenses—18–28mm, 35–300mm, 120–600mm, 420–800mm and most any lens combination you can think of in-between. Most of these zoom lenses also feature macro capability.

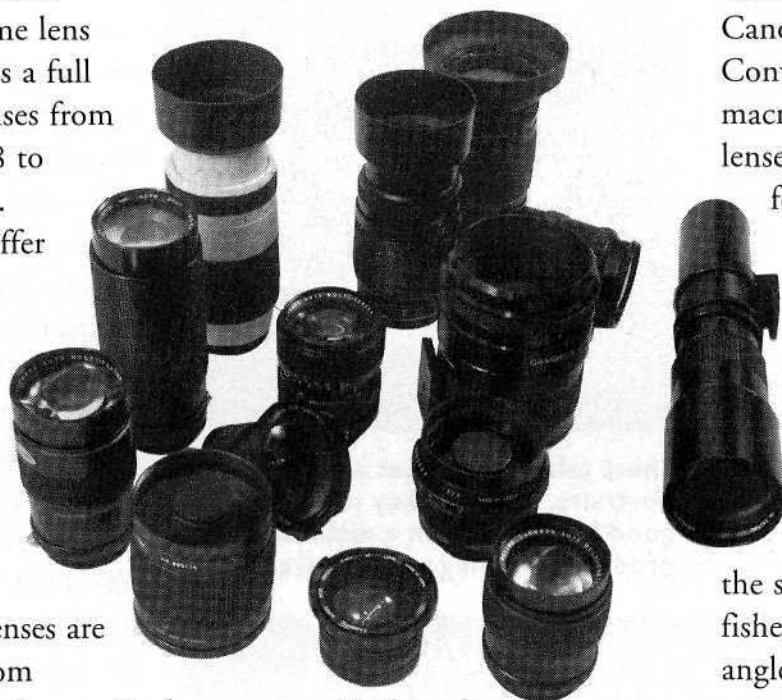
Cambron is also the manufacturer of very small mirror lenses such as the Mighty Midget Micro Mirror 500, and the new 300mm Mighty Midget mirror. They also offer a 1000mm f/10 mirror lens.

The prime lens line includes a full range of lenses from 20mm f/3.8 to 500mm f/8.

They also offer several teleconverters to extend the capabilities of these lenses even more.

Cambron lenses are available from

Cambridge Camera Exchange.



Cambron lenses

CANON

Canon's EF lenses are renowned for their reliability and silent operation due to the elimination of mechanical couplings.

Canon lenses provide a unique blend of focal lengths and special features. Right at the top of the list is a 14mm f/2.8 superwide-angle, and a 15mm f/2.8 fisheye. There are lenses of 20mm, 24mm, 28mm, and 35mm until you finally reach the normal lenses. There you will discover that Canon has an extremely fast 50mm f/1.0 in addition to the 50 f/1.4 and f/1.8.

Their exciting new L-series of telephoto lenses feature the Image Stabilizer that compensates for camera shake, allowing you to shoot up to two shutter speeds slower than the 1/focal length rule states—as slow as $\frac{1}{100}$ with a 400mm IS lens, for example. Some of the latest offerings in this L-series are the 300mm f/2.8L IS USM, 400mm f/2.8L IS USM, 500mm f/4L IS USM, and the 600mm f/4L IS USM. There's even a 1200mm f/5.6L (without image stabilizer)—an over-\$75,000 beast that mostly rents to pros.

There are also several zoom lenses that feature this new Image Stabilizer technology for sharper pictures. The 100–400mm, 28–135mm and 75–300mm are three zooms that have this great feature.

Hidden in the middle of the telephotos is a special



Canon supertelephoto EF lenses with Image Stabilizer

135mm f/2.8 with Softfocus, which is great for portraits. Canon's macro lens system includes a 50mm f/2.5, Life-Size Converter, a 100mm f/2.8 and a 180mm L-series telephoto macro. The unusual includes three manual-focus Tilt-Shift lenses—a 24mm, 45mm, and a 90mm—which provide shift for perspective control plus tilt for distortion and depth-of-field control.

CONTAX/YASHICA

For generations, Carl Zeiss T lenses have been famous for true-to-life images and outstanding color reproduction. More than 40 high-quality Carl Zeiss T* lenses currently supply both the Contax and Yashica camera systems with some pretty incredible lenses. In the superwide area we have the 16mm f/2.8 full-frame fisheye, 15mm f/3.5, 18mm f/4, and a 21mm f/2.8 wide-angle lenses. If you want a little less angle, but more speed, you can go with the 35mm f/1.4 superfast wide angle lens. If you need perspective control, they offer the 35mm f/2.8 shift lens. In the mid-range focal lengths, there are almost a dozen lens and f-stop variations within the 48–100mm range.

If you like telephoto lenses, then take a look at the 200mm f/2, 210mm f/1.2, 500mm f/4.5, and 1000mm f/5.6. These lenses are very fast for their respective focal lengths, and have that Carl Zeiss quality to match.

Most of the zoom lenses start at wide-angle and cross over to the telephoto range. The two most extreme in the Zeiss line are the 28–85mm and the 35–135mm lenses. Telephoto zooms start with an 80–200mm and end with the 100–300mm super telephoto.

All the lenses we mentioned fit both the Contax and Yashica camera systems, as they have the same camera mount. If you have the Yashica system, you can also use one of four lenses specifically designed for the Yashica camera. Three are wide-angle-to-telephoto

**Carl Zeiss Vario-Sonnar T*
100–300mm f/4.5–5.6 (MM) zoom**



zooms working in the 28–200mm range, and one is a prime lens at 50mm f/1.9.

LEICA

Leica has two lens systems: the Leica M system for its rangefinder cameras, and the Leica R lenses for its SLR cameras. The M system consists mainly of prime lenses from 21mm through 135mm, with couple of zooms in the middle. Many of the 35mm and 50mm lenses have very fast f/1.4 f-stops. Several of the lenses offer a choice of outside finish that includes black, silver chrome and titanium finishes.

A new high-performance 90mm f/2 has an aspherical lens surface, APO-corrected quality, and is designed for portrait photographers and photojournalists. They also feature the Tri-Elmar-M lens that combines three of the most popular focal lengths into one lens. Three click-stop settings allow you to work at 28mm, 35mm and 50mm focal lengths.

The R lenses cover a much broader range of focal lengths, and include the impressive 15mm f/3.5 and 19mm f/2.8 superwide-angle lenses. If you want fast lenses, then the Leica 35mm f/1.4 Summilux-R might be your best bet.

Architectural photographers can make perspective corrections



Leica Elmarit-M lenses for Leica M-series rangefinder cameras

with the 28mm f/2.8 PC lens. You will also find several fast telephoto lenses from 80mm to 180mm that are well suited to journalism and portraiture.

The Leica APO-TELYT-R Modular system uses three focus modules combined with two different front elements. Mixing these together in combination will give you six possible lens focal lengths ranging from 280mm to 800mm.

The latest addition to zoom lenses in the R lens line is the new 35–70mm f/2.8 Vario-Elmarit-R ASPH zoom lens. This fast lens has a constant aperture throughout its zoom range, not usually the case with zoom lenses. There are many more zoom lenses in the R series that span the distance from 28mm to 280mm.

MINOLTA

Minolta offers a complete line of autofocus lenses designed to complement its 35mm Maxxum cameras. Prime lens focal lengths start at a 16mm f/2.8 full-frame fisheye and continue throughout the entire range to the 600mm f/4 APO supertelephoto. The mid-range lenses consist of several macro lenses including a 50mm f/2.8 and a special 3X–1X

macro zoom with an impressive f/1.7–f/2.8 maximum aperture.

Zoom lenses cover the gamut of superwide 17–35mm to the 100–400mm telephoto zoom. When it comes to low-light lenses, Minolta has covered the range with a new 35mm f/1.4, 50mm f/1.4, 85mm f/1.4, and 80–200mm f/2.8 zoom. Portrait photographers will love the special Soft Focus 100mm f/2.8 lens.

The X-series lenses are designed for all Minolta non-autofocus SLR cameras. The prime lenses start with the 24mm f/2.8 wide-angle and end with the 135mm f/2.8 short telephoto. The series also includes 50mm and 100mm macro lenses and several zooms that range from 24–35mm wide zoom thru the 100–300mm telephoto zoom.

NIKON

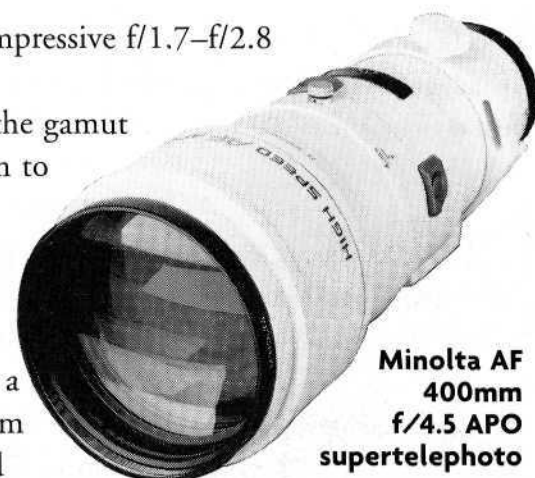
When it comes to lens choice, Nikon has both quality and quantity. Over the years Nikon has developed a variety of technologies to make some of the best lenses in the world. The ED lens series uses an Extra-Low Dispersion glass to minimize chromatic aberration. Many of the newer lenses have the AF D-type classification that send subject-position information to the camera's metering system for more-accurate exposures.

Nikon has also incorporated a variety of focus systems in its lens designs, including IF (Internal Focus) where the lens does not change size when focusing, and RF (Rear Focus) where only the rear elements of the lens move to focus. Their AF-S lenses feature Silent Wave Motors that enable high-speed autofocus that's extremely accurate and quiet.

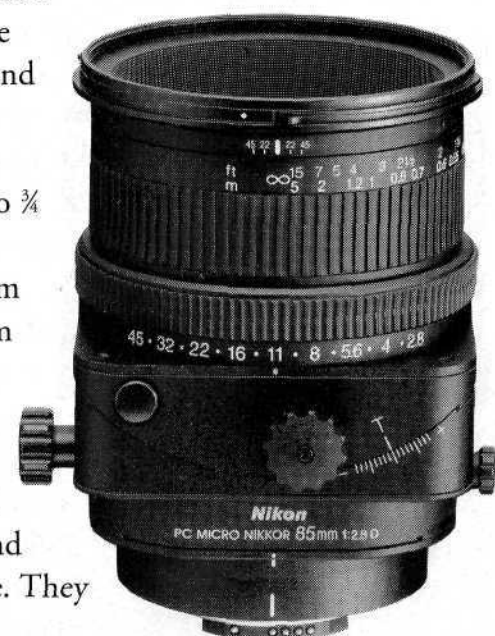
Nikon has a vast collection of AF lenses that includes a whole line of prime and zoom lenses that range from the 16mm f/2.8 full-frame fisheye to the 600mm f/4 ED-IF super telephoto lens. In between you will find a wide assortment of both prime and zoom lenses to fit just about every possible situation.

The selection of AF macro lenses includes three prime macros (60mm, 105mm and 200mm) and a very impressive 70–180 macro zoom that focuses down to $\frac{3}{4}$ life size.

The latest offerings from Nikon include a 17–35mm f/2.8 and the 28–70mm f/2.8 which feature the Silent Wave Motor. A PC 85mm f/2.8 shift lens will be great for commercial and nature photographers alike. They



**Minolta AF
400mm
f/4.5 APO
supertelephoto**



PC Micro-Nikkor 85mm f/2.8D

also feature a 28–105mm and a new 28–200mm f/2.8D lens. In addition to their series of AF lenses, Nikon also makes a full series of manual-focus lenses.

OLYMPUS

The direction Olympus has taken is slightly different than other lens manufacturers as its main concentration is with prime lenses and very specialized macro lenses. The prime

lenses start with an impressive 16mm full-frame fisheye and finish with a 1000mm f/11 super telephoto. Most of these lens designs from Olympus come in two f-stop flavors with a one-stop difference between most. As an example there is a 24mm f/2 and f/2.8 and a 180mm f/2 and f/2.8.

The macro group is one of the most extensive and contains a variety of macro lenses, starting with the very tiny 20mm f/2 and working up to the 135mm f/4.5. Some of the macros are stand-alone lenses, while other require the use of the Olympus auto bellows.



Olympus Zuiko 35–80mm f/2.8 ED zoom

PENTAX

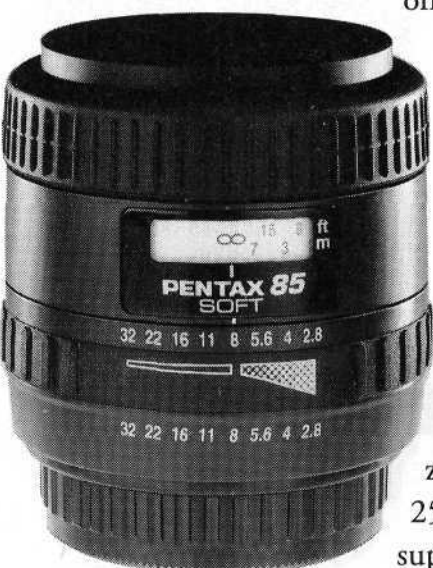
The Pentax FA and F series of autofocus lenses cover a wide variety of focal lengths. The FA autofocus lenses provide power-zoom capability. FA* high-performance lenses incorporate such features as extra-low dispersion elements, internal focusing, one-touch auto/manual focus, and inner zooming. Pentax lenses all utilize the SMC super multi-coating. This seven-layer coating reduces surface reflections, thus increasing light transmission to increase color rendition and sharpness.

The FA series of lenses range from 20mm to 600mm. They include 28mm and 85mm f/2.8 soft-focus lenses, 50mm and 100mm f/2.8 macro lenses, and some very high-quality supertelephoto lenses. Some very fast lenses like the 85mm f/1.4 and 300mm f/2.8 round out the prime lenses. Pentax also

offers a wide assortment of SMCP-FA zoom lenses. They range from the 28–200mm f/3.8–5.6 to the 80–320mm f/4.5–5.6 as well as the fast 80–200 f/2.8 ED[IF].

The F series has fewer lenses but spans a broader range of focal lengths. The group starts off with a 17–28mm full-frame fisheye zoom and ends with a fast 250–600mm f/5.6 supertelephoto zoom.

The A-series includes a wide range of manual focus-lenses. If



Pentax SMCP-FA Soft 85mm f/2.8

you want super wide-angle, you can pick from the 15mm f/3.5 corrected wide-angle or the 16mm f/2.8 full frame fisheye lens. The A-series also includes several mid-range prime and zoom lenses including a 28mm f/3.5 perspective-control lens. At the far end of the range you will find two mirror lenses, the 1000mm f/11 and 2000mm f/13.5. If you prefer the traditional long-lens design, the Pentax A series features a 500mm, 600mm and 1200mm lens.

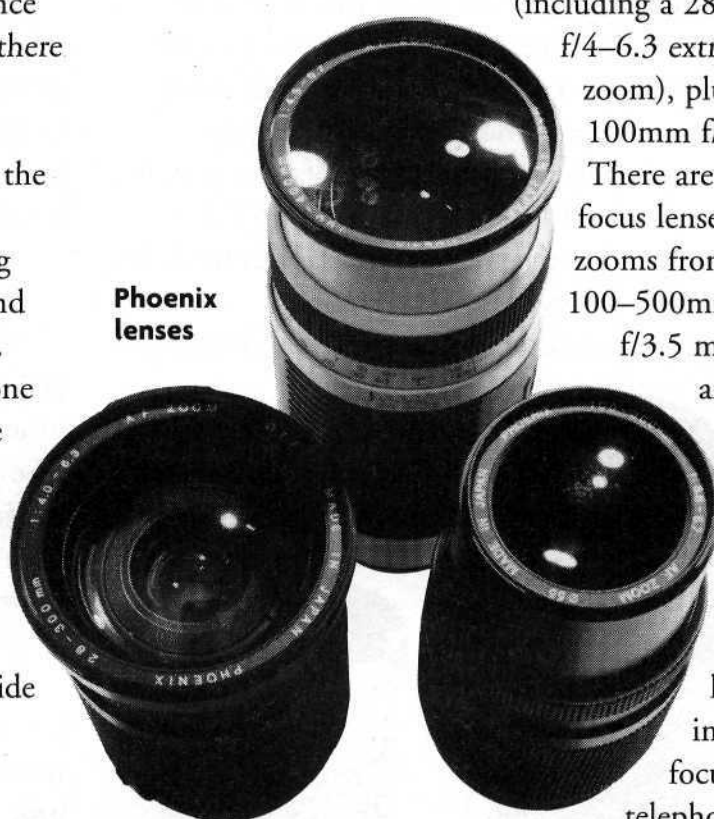
PHOENIX/SAMYANG

Phoenix offers an economically priced line of quality lenses for popular AF 35mm SLRs. Included are autofocus zooms from 19–35mm f/3.5–4.5 to 100–400mm f/4.5–6.7

(including a 28–300mm f/4–6.3 extreme-range zoom), plus an autofocus 100mm f/3.5 macro lens. There are also manual-focus lenses including zooms from 19–35mm to 100–500mm, a 100mm f/3.5 macro and 24mm and 28mm f/2.8 wide-angles.

Phoenix also markets the economically priced Samyang lens line, which includes manual-focus 500mm telephoto and mirror

lenses, and 18–28mm f/4–4.5, 35–70mm f/3.5–4.5 and 75–300mm f/4.5–5.6 zooms to fit most popular 35mm SLRs.



Phoenix lenses

SIGMA

Sigma is a manufacturer of lenses for most popular 35mm cameras on the market. They use aspherical lenses to enhance optical performance and minimize lens size and weight. Aspherical lenses help minimize lens flare and edge distortion, which are common problems associated with wide-angle and zoom lenses. Sigma's APO telephoto lenses minimize color aberration using special low-dispersion glass to achieve outstanding crispness and sharpness.

Sigma's offerings are split about 50/50 between zoom lenses and prime lenses. The prime lenses range from an 8mm circular fisheye to a 1000mm supertelephoto. Sigma offers a very strong telephoto section featuring 300mm, 400mm, 500mm, 800mm and 1000mm lenses. They also offer a 600mm mirror lens that has a rear-loading slot for filters. Sigma also makes teleconverters for several of the APO zoom lenses to extend your shooting range even further.

The zoom lenses start with a 17–35mm Aspherical HSM superwide-angle zoom. It changes your angle of view from 63° to 104° and the HSM (Hyper Sonic Motor) provides higher AF speeds and quieter operation. Working up the focal-length scale you will find enough zoom lenses to cover any photo

Sigma 8mm f/4 EX circular fisheye



while the 300mm and 400mm enable 1:3 ratios. Three zoom macro lenses extend the capabilities of shooting close with a 28–80mm, 28–200mm, and a new 70–300mm lens.

TAMRON

Tamron offers AF lenses dedicated to Canon, Nikon, Minolta, and Pentax camera systems. To keep chromatic lens aberration to a minimum, Tamron uses Low Dispersion (LD) glass elements. They also have incorporated an Internal Focusing System (IF) to enhance lens maneuverability.

A full line of prime, zoom, and macro autofocus lenses are offered by Tamron. The range of focal lengths in this group starts with a newly introduced 14mm f/2.8 superwide-angle, and continues up the scale to the 200–400mm f/5.6 zoom lens. In-between you will find three new zooms: 28–105mm

f/2.8, 28–200mm f/3.8–5.6, and 28–300mm f/3.5–6.3. They also feature a 90mm f/2.8 macro lens that gives 1:1 life-size images.

Tamron stands apart from other manufacturers with its use of an interchangeable mount system instead of a fixed-mount. The MF lenses use the Adaptall-2 Interchangeable Mount system to make all manual focus lenses compatible with a wide range of SLR cameras. Starting with the

Tamron AF 28–200mm f/3.5–5.6 LD Aspherical zoom

wide-angle lenses, we find a 17mm f/3.5 and a 24mm f/2.5. Several mid-range zooms such as the 28–200mm, 70–210mm, and 60–300mm take care of the middle focal lengths. Finishing out the list we find a 90mm macro, 500mm mirror, and a very fast 300mm f/2.8 supertelephoto.

TOKINA

Tokina makes lenses that work with specific camera bodies, such as Nikon, Canon, Minolta, Pentax, Yashica/Contax and Olympus.

AT-X lens technology (Advanced Technology-Xtra) signifies a special group of lenses that Tokina manufactures using the most advanced design and fabrication technologies. The AT-X Pro Series of autofocus lenses are designed to meet the demands of the professional photographer. Each lens has a gold ring around the front edge indicating it is a member of this professional line of lenses. The prime lenses in this series include the 17mm f/3.5 and 300mm f/2.8. Three zooms (20–35mm f/2.8, 28–70mm f/2.6–2.8, and 80–200mm f/2.8) round out this elite group of lenses.

The AT-X series of autofocus lenses include an extreme range zoom of 80–400mm, a 100mm f/2.8 macro, a 100–300mm f/4

telephoto zoom, and two prime telephoto lenses with focal lengths of 300mm and 400mm. There's also a manual-focus AT-X lens, the 150–500mm f/5.6 supertele zoom.

Tokina also makes other lens lines like the AF series, and several groups of lenses specifically designed for use with manual-focus cameras.



Tokina AT-X 17mm f/3.6 Pro

VIVITAR

Vivitar's Series 1 line features a half-dozen premium-optics lenses compatible with Nikon, Minolta and Canon AF cameras. The 28–210mm f/4.2–6.5 is a surprisingly compact lens measuring only 3.9 inches and weighing in at less than 14 ounces. This autofocus lens is also available for Pentax 35mm SLR cameras. The 70–300mm f/4.5–5.6 covers an extensive focal-length range in just one 5.4-inch lens. This model also offers macro capability with a reproduction ratio of 1:2 and a minimum focusing distance of 4.9 feet. The 19–35mm f/3.5–4.5 is an extreme wide-angle compact zoom that is ideal for scenic photography. The other AF zooms include the 100–400mm f/4.5–6.7, 28–105mm f/2.8–3.8 and the 28–300mm f/4–6.3.

The Series 1 line also features two zoom lenses for manual-focus cameras: the 19–35mm f/3.5–4.5 and the 28–105mm f/2.8–3.8.

In addition to its Series 1 line, Vivitar offers almost 15 other moderately priced, but excellent quality lenses for both autofocus and manual-focus cameras. ■



Vivitar Series 1 28–210mm f/4.2–6.5 zoom